

## **REMARKS**

Upon entry of the present amendment, claims 1-9 are pending in the above-referenced patent application and are currently under examination. Claims 1, 6 and 7 have been amended. Support for the amendments can be found throughout the specification.

Reconsideration of the application is respectfully requested.

Support for the amendments to the claims can be found in the specification at page 12, line 3 to page 13, line 3 and in claim 1 as filed.

The claims are rejected in various combinations under 35 U.S.C. § 112, 2d paragraph and 35 U.S.C. § 103(a). In addition, claims 1-9 have been objected to. Each of these rejections and objections is addressed below in the order set forth by the Examiner.

### **I. OBJECTIONS**

The Examiner has objected to claims 1-9 for labeling the steps of claim 1 with numbers, but referring to the steps by letters. Applicants note that the steps have been relabeled with letters. Accordingly, Applicants respectfully request that the Examiner withdraw this objection.

### **II. REJECTION UNDER 35 U.S.C. § 112, 2d**

Claims 1, 6 and 7 have been rejected under 35 USC § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Applicants respectfully traverse the rejection in view of the comments below.

The test for indefiniteness is “whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity” (MPEP § 2173.02). This analysis does not occur in a vacuum, but rather in view of the following factors: (1) the content of the particular application disclosure; (2) the teachings of the prior art; and (3) the claim interpretation that would be given by one possessing the ordinary level of skill in

the pertinent art at the time the invention was made. In addition, “the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope” (MPEP § 2173.02).

**1. “the water content”**

The Examiner alleges that the phrase in step (a) of claim 1, “the water content,” lacks antecedent basis. Applicants note that step (a) of claim 1 has been amended to read “water content,” thus making the recitation in step (a) the first recitation of “water content.” Being the first recitation, “water content” in amended step (a) does not require antecedent basis and is not indefinite under 35 U.S.C. § 112, 2d paragraph. Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

**2. “the formed slurry product”**

The Examiner alleges that the phrase in step (c) of claim 1, “the formed slurry product,” lacks antecedent basis. Applicants note that step (c) of claim 1 has been amended to read “a formed slurry product,” thus making the recitation in step (c) the first recitation of “formed slurry product.” Being the first recitation, “formed slurry product” in amended step (c) does not require antecedent basis. Thus, amended claim 1 is not indefinite under 35 U.S.C. § 112, 2d paragraph for the recitation of “a formed slurry product” in step (c). Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

**3. “the recirculating solvent”**

The Examiner alleges that the phrase in step (g) of claim 1, “the recirculating solvent,” lacks antecedent basis. Applicants note that step (b) of claim 1 recites “a recirculating solvent medium,” thus providing the necessary antecedent basis for the recitation in step (g):

- (b) Subjecting said dried waste to a thermochemical liquefaction process in the presence of **a recirculating solvent medium** at a temperature of about 275°C to 375°C and a pressure of up to 10 atmospheres, thereby obtaining gaseous, liquid and solid products; (emphasis added)

As step (b) provides a recitation of “a recirculating solvent medium,” Applicants respectfully submit that amended claim 1 is not indefinite under 35 U.S.C. § 112, 2d paragraph for the

recitation of “the recirculating solvent medium” in step (g). Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

#### **4. “the ratio of solvent”**

The Examiner alleges that the phrase in claims 6 and 7 “the ratio of solvent,” lacks antecedent basis. Applicants note that claims 6 and 7 have both been amended to remove the phrase “the ratio of solvent” and now read as follows: “wherein the solvent and dried waste are present in a ratio of ...” As “ratio” is preceded by “a”, claims 6 and 7 are the first recitation for the ratio of solvent to dried waste. In addition, both “solvent” and “dried waste” are each recited in step b of amended claim 1. Thus, “solvent”, “dried waste” and “ratio” are not indefinite under 35 U.S.C. § 112, 2d paragraph for lacking proper antecedent basis. Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

### **III. REJECTION UNDER 35 U.S.C. § 103(a), ESPENSCHIED**

Claims 1-9 have been rejected under 35 USC § 103(a) as allegedly being obvious over Espenscheid (U.S. Patent No. 4,089,773). Applicants respectfully traverse the rejection in view of the comments below.

A claim is considered obvious “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains” (35 USC § 103(a)). Several elements are necessary in order to make a prima facie case of obviousness (MPEP § 2143):

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Accordingly, in order for the claims of the instant application to be obvious in view of the cited art, each reference must (1) teach or suggest the claim elements; (2) provide some suggestion or

motivation to modify the reference in order to teach all of the elements; and (3) provide a reasonable expectation of success of making a compound of the instant application. As discussed in detail below, none of the cited references satisfies all three requirements under MPEP § 2143.

The Examiner alleges that Espenscheid discloses a process for solubilization of solid carbonaceous material comprising the steps set forth in Table 1 below. Applicants respectfully traverse the rejection in view of the comments below.

**1. Espenscheid does not teach or suggest the elements of the claims**

Table 1 provides an element-by-element comparison of claim 1 of the instant application and the teachings of Espenscheid.

**Table 1.** Comparing elements of instant claim 1 to Espenscheid

STEP	CLAIM 1 OF INSTANT APPLICATION	ESPENSCHIED	COMMENTS
(a)	Drying said waste to reduce water content to below 15%	Heating at a temperature between about 400 °F and about 1200 °F and a pressure between about <b>200 and 6000 psi</b> in presence of a hydrogen-donor-liquefaction solvent (col. 3, lines 1-5)	200 to 6000 psi is equivalent to 14 to 428 atmospheres, making the minimum pressure of Espenscheid greater than the maximum pressure of the instant claims
(b)	Subjecting said dried waste to a thermochemical liquefaction process in the presence of a recirculating solvent medium at a temperature of about 275°C to 375°C and a pressure of <b>up to 10 atmospheres</b> , thereby obtaining gaseous, liquid and solid products		
(c)	Separating a formed slurry product from condensable gas, water and other liquid fractions boiling out at up to 250°C	No teaching	

STEP	CLAIM 1 OF INSTANT APPLICATION	ESPENSCHIED	COMMENTS
(d)	Transferring said slurry product obtained from thermal extraction from step c to a pyrolysis apparatus and treating the same at a temperature of about 350°C to 500°C to cause additional thermal destruction of unconvertible organic matter of feed material and heavy liquid fractions obtained in step c and their evaporation and removal from pyrolysis apparatus	Forming a slurry of comminuted carbonaceous material and the solvent and heating the slurry for 0.2 to 3 hours sufficient to convert the slurry into heavy oil or pitch-like consistency (col. 3, lines 4-11)	STEPS (B) AND (D) OF ESPENSCHIED ARE PERFORMED IN THE SAME APPARATUS, WITHOUT AN INTERMEDIATE SEPARATING STEP
(e)	Separating vapor products from condensable oil products	At the conclusion of the solubilization step, heavy solids can be removed in a settler. Gaseous products are recovered when the closed system is vented. (col. 7, lines 61-65) It is a further embodiment of the process to subject the recovered heavy oil products to petroleum refining upgrading to premium motor fuels. (col. 8, lines 36-39)	No teaching of separation via vacuum distillation
(f)	Vacuum distillation of oil products from step a for the removal of fractions having a boiling temperature of between 250°C and 350°C		
(g)	Recirculating a fraction having a boiling temperature of above 300°C as the recirculating solvent medium for step b	The liquefaction solvent component is recycled to the first step of the process (col. 8, lines 31-33)	

The Examiner alleges that steps (a) and (b) of amended claim 1 are taught by the disclosure in Espenscheid that the mixture is heated “at a temperature between about 400 °F and about 1200 °F and a pressure between about **200 and 6000 psi** in presence of a hydrogen-donor-liquefaction solvent” (emphasis added). Applicants respectfully note that 200 psi is equivalent to a little more than 14 atmosphere. In stark contrast to Espenscheid, the pressures used in thermal extraction step (b) of the instant application are *less than 10 atmospheres*. Accordingly,

Applicants respectfully submit that not only does Espenscheid fail to teach thermal extraction step (b) of the present invention, Espenscheid actually teaches away from step (b).

In addition, Espenscheid fails to teach separation step (c). The Examiner submits that separation step (c) is not specifically mentioned by Espenscheid, but alleges that it would have been obvious to one of skill in the art to use the separation step after steps (e) and (f) as taught in Espenscheid, and modify Espenscheid to use an intermediate separation step. Applicants disagree. The instant invention has at least two distinct separation steps, steps (c) and (e). Espenscheid teaches only a *single* separation step. Applicants submit that one of skill in the art starting with the single separation step of Espenscheid would not be motivated to add another separation step between the thermal extraction and pyrolysis steps, as is instantly claimed.

As thermal extraction step (b) and pyrolysis step (d) of Espenscheid are performed in the absence of an intermediate separation step, the thermal extraction step and pyrolysis step of Espenscheid are performed in the *same apparatus*. Unlike in Espenscheid, the method of the instant invention has an intermediate separation step between thermal extraction step (b) and pyrolysis step (d). In addition, steps (b) and (d) of the instant invention are performed in different apparatus: slurry product obtained from thermal extraction [is transferred] to a pyrolysis apparatus. (Step (d) of the instant claims.) Accordingly, Espenscheid fails to teach thermal extraction step (b) performed in one apparatus and pyrolysis step (d) performed in a second apparatus.

Espenscheid also fails to teach vacuum distillation step (f). The Examiner submits that Espenscheid does not specifically mention vacuum distillation, but alleges that the further refining “must have been a vacuum distillation unit to facilitate separation without using a high temperature in the distillation column” (page 5). Applicants disagree.

There is no indication in Espenscheid that the further refining is performed in the absence of heat, thus necessitating a vacuum distillation. The lack of disclosure of heat does not automatically lead to the conclusion that the separation must be performed via vacuum distillation in the absence of a specific teaching or suggestion of vacuum distillation. Thus, Espenscheid fails to teach vacuum distillation step (f).

As Espenscheid fails to teach the characterizing pressure of less than 10 atmospheres of thermal extraction step (b), separating step (c), pyrolysis step (d) in a separate apparatus and vacuum distillation step (f), Espenscheid fails to teach all the elements of the claims. Thus, the claims are not obvious over Espenscheid. Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

**2. Espenscheid provides no suggestions or motivation to modify the reference in order to teach all the elements of the claims**

As noted above, thermal extraction step (b) is performed at a pressure of less than 10 atmospheres. The thermal extraction step of Espenscheid, however, operates at a pressure of at least 14 atmospheres and up to 428 atmospheres. As the minimum pressure taught by Espenscheid is greater than the highest pressure claimed by the instant invention, Applicants submit that Espenscheid provides no motivation or suggestion to lower the pressure of the thermal extraction step to the level of the instant invention, less than 10 atmospheres.

Furthermore, the thermal extraction and pyrolysis steps of the instant invention are performed in different apparatus and there is an intermediate separation step. Espenscheid, however, provides no teaching of a separation step between the thermal extraction and pyrolysis steps. In fact, there is no need in Espenscheid for such a separation step as the thermal extraction and pyrolysis steps of Espenscheid are performed in the same apparatus. Thus, since Espenscheid fails to teach a separation step between the thermal extraction and pyrolysis steps, and performs the thermal extraction and pyrolysis steps in the same apparatus, there is no suggestion or motivation to modify Espenscheid and arrive at the instantly amended claims.

Espenscheid also teaches a further refining step to obtain premium motor fuels, that the Examiner alleges teaches the vacuum distillation step of the instant invention. Applicants respectfully note that there is no teaching in Espenscheid of using vacuum distillation. While Espenscheid is silent as to the temperature used for the further refining step, the lack of a given temperature does not suggest a vacuum distillation, nor provide motivation to modify Espenscheid to use a vacuum distillation.

Thus, since Espenscheid teaches a pressure of 200-6000 psi (14-428 atmospheres), Espenscheid provides no suggestion or motivation to start with a minimum

pressure of 14 atmospheres and arrive at a pressure of 10 atmospheres for the claimed pressure in the thermal extraction step. Espenscheid also provides no suggestion or motivation to start from performing the thermal extraction and pyrolysis steps in a single apparatus with no intermediate separation step, to performing thermal extraction step (b) and pyrolysis step (d) in different apparatus with separation step (c), as is instantly claimed. In addition, Espenscheid provides no suggestion or motivation to start with a further refining step and arrive at a vacuum distillation step. Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

**3. Espenscheid provides no reasonable expectation of success**

Espenscheid provides no reasonable expectation of success since Espenscheid teaches a minimum pressure of 14 atmospheres for the thermal extraction step while the instant claims provide that the maximum pressure is only 10 atmospheres. In addition, there is no reasonable expectation of success provided by the teaching in Espenscheid to start with performing the thermal extraction and pyrolysis steps in a single apparatus with no intermediate separation step and arrive at performing thermal extraction step (b) and pyrolysis step (d) in different apparatus with separation step (c) intervening, as is instantly claimed. Furthermore, Espenscheid provides no reasonable expectation of success to start with a further refining step that is silent as to temperature and pressure, and arrive at a vacuum distillation step, as is instantly claimed. Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.

As Espenscheid fails to teach or suggest all the elements of the claims, provides no motivation or suggestion to modify Espenscheid and arrive at the instant invention, and provides no reasonable expectation of success, the claims of the instant invention are not obvious over Espenscheid. Accordingly, Applicants respectfully request that the Examiner withdraw this aspect of the rejection.



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PATENT

**CONCLUSION**

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Alex E', with a stylized flourish at the end.

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